Name:

Kennedy High School
Summer 2021 Math Packet
For Rising AP Calculus AB/BC Students

This packet is an optional review of the skills that will help you be successful in Statistics in the fall. By completing this packet over the summer, you will keep your brain mathematically active and you will also be able to identify skills that you need to strengthen. If you struggle with any of the exercises, please seek help from a friend, parent, sibling, book, or online resource. Enjoy your math review and we look forward to meeting you in August!

I. Factor each of the following expressions.

1. $3x^2+6x$
2. x^2+5x+6
3. $3x^2-x-2$
4. $x^2-8x+15$
5. $9x^2-9x+2$
6. $x^2-14x+45$
7. $x^2-10x+25$
8. $64x^2-49y^2$
9. $3x^3-2x^2-6x+4$

II. Simplify each of the following expressions.

1. $\dfrac{x-4}{x^2-3x-4}$
2. $\dfrac{x^3-8}{x-2}$
3. $\dfrac{5-x}{x^2-25}$
4. $\dfrac{x^2-4x-32}{x^2-16}$

5. $\dfrac{1}{x+h}-\dfrac{1}{x}$

6. $\dfrac{\dfrac{2}{x^2}}{\dfrac{10}{x^5}}$

7. $\dfrac{\dfrac{1}{3+x}-\dfrac{1}{3}}{x}$

8. $\dfrac{2x}{x^2-6x+9}-\dfrac{1}{x+1}-\dfrac{8}{x^2-2x-3}$

9. $\dfrac{\dfrac{25}{a}-a}{5+a}$

10. $\dfrac{\dfrac{x}{x+1}-\dfrac{1}{x}}{\dfrac{x}{x+1}+\dfrac{1}{x}}$

III. Solve for z.

1. $4x + 10yz = 0$

2. $y^2 + 3yz - 8z - 4x = 0$

IV. Simplify.

1. $\dfrac{\sqrt{x}}{x^{\frac{2}{3}}}$

2. $e^{\ln 3}$

3. $e^{(1+\ln x)}$

4. $\ln 1$

5. $\ln e^{7}$

6. $\log_3(1/3)$

7. $\log_{1/2} 8$

8. $\ln \dfrac{24}{\sqrt{e}}$

9. $e^{3 \ln x}$

10. $\dfrac{4xy^{-2}}{12x^{-\frac{1}{3}}y^{-5}}$

11. $27^{2/3}$

12. $(5a^{2/3})(4a^{3/2})$

V. Write the equation of a line with each of the following characteristics in point slope form.
$(y-y_1)=m(x-x_1)$

1. slope $m=-2$ and containing the point (5, 4)

2. containing the two points (1,-3) and (-5, 2)

3. slope $m = 0$ and containing the point (1, -6)

4. parallel to 2x – 3y = 7 and passing through (5 , 1)

5. perpendicular to the line in problem #1 and containing the point (3, 4)

VI. Without a calculator, sketch each parent function and the transformations of it.

1. $f(x) = x^2$; $g(x) = (x-2)^2$; $h(x) = -2x^2 + 4$

2. $f(x) = e^x$; $g(x) = e^{-x}$; $h(x) = e^{x-2}$

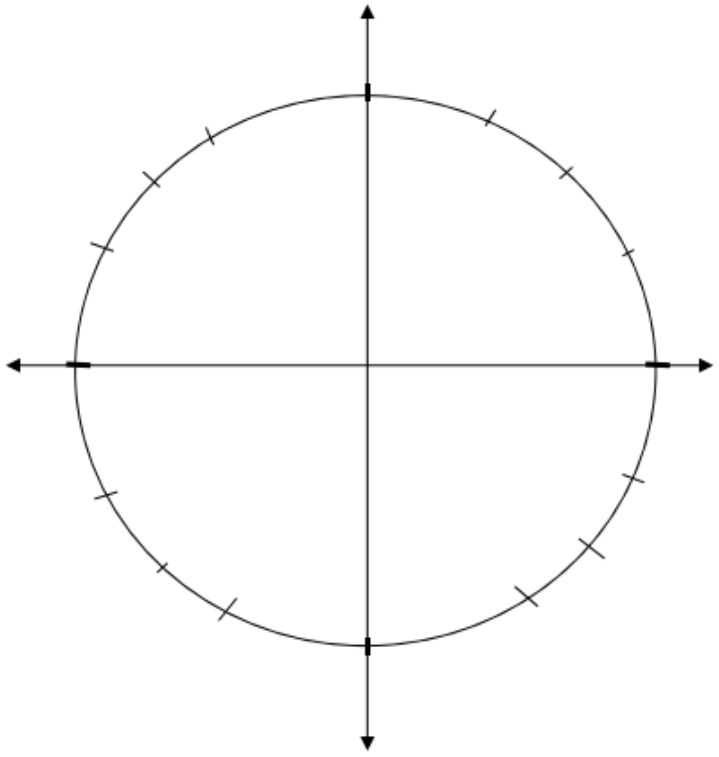
3. $f(x)=\ln x\,;\ g(x)=-\ln(x+4)\,;\ h(x)=2\ln(-x)$

4. $f(x)=\sin x\,;\ g(x)=\sin(x-\pi)+2\,;\ h(x)=-4\sin(2x)$

5. $f(x)=x^3\,;\ g(x)=1-x^3\,;\ h(x)=(2-x)^3-3$

6. $f(x)=\sqrt{x}\,;\ g(x)=2+\sqrt{-x}\,;\ h(x)=-\sqrt{x-3}$

VII. Label the unit circle with angles (in radians) and the x and y-coordinates of each important point on the circle.



VIII. Without a calculator, complete the following table for angles $0 \le x \le 360$.

Angle in Degrees (x)	Angle in Radians (x)	$\sin x$	$\cos x$	$\tan x$
30^o				
		1	0	
	$\frac{5\pi}{6}$			
			$\frac{1}{2}$	$-\sqrt{3}$
315^o				
	$\frac{11\pi}{6}$			
		$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	
45^o				

IX. Without a calculator, evaluate each of the following. All angle measures should be written in radians.

1. $\csc\left(-\frac{5\pi}{6}\right)$

2. $\sec \pi$

3. $\cot\left(-\frac{\pi}{2}\right)$

4. $\tan\frac{\pi}{2}$

5. $\sin\frac{5\pi}{6}$

6. $\cot\frac{2\pi}{3}$

7. $\sin\frac{\pi}{2}$

8. $\sec\left(-\frac{3\pi}{4}\right)$

9. $\csc \pi$

10. $\sec\frac{11\pi}{6}$

11. $\cot\frac{4\pi}{3}$

12 $Cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

X. Without a calculator, identify all asymptotes and points of discontinuity in each of the following functions.

1. $f(x)=\frac{5x^2+x}{5x+1}$

2. $g(x)=\frac{3x^2+x-9}{2x-4}$

3. $h(x)=\frac{2x-5}{7x+1}+3$

4. $j(x)=\frac{2}{9x-18}$

XI. Without a calculator, identify the end behavior of each of the following functions.

1. $f(x) = -x^4 + 3x^3 + 11x - 1$

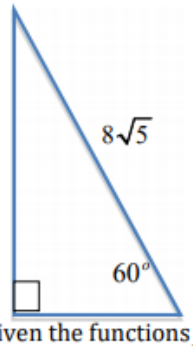
2. $g(x) = 3x^5 + 2x^2$

3. $h(x) = 2\log_2(x-3)$

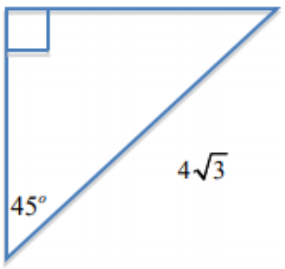
4. $j(x) = \dfrac{10x-4}{4x+1}$

XII. Solve for each of the missing sides.

1.



2.



XIII. Given the functions f, g, h, evaluate/simplify each of the following.

$f(x) = x^2 + x$ $\quad$ $g(x) = \sqrt{x}$ $\quad$ $h(x) = \dfrac{1}{x}$

1. $g(3)$

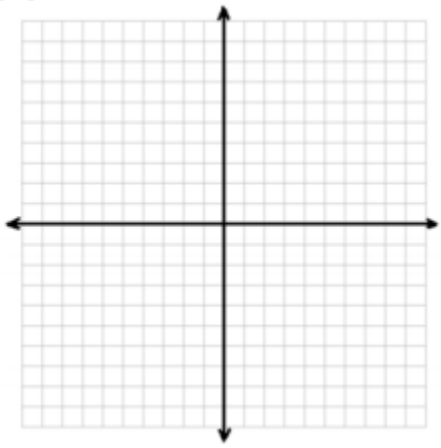
2. $g(h(9))$

3. $h(x+4)$

4. $f(x+t)$

XIV. Graph each of the following piecewise functions.

1. $f(x) = \begin{cases} x+1, x<0 \\ x^2, x \geq 0 \end{cases}$



2. $j(x)=\begin{cases}\dfrac{x^2-4}{x-2}, x\neq 2\\ 5, x=2\end{cases}$